

**U.S. DEPARTMENT OF ENERGY
NUCLEAR ENERGY RESEARCH INITIATIVE
ABSTRACT**

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Institution: Westinghouse Electric Company

Collaborators: None

Title: Standards and Guidelines for Cost Effective Layout and Modularization of Nuclear Reactor Plants

This task is to develop and promulgate standards and guidelines which, if followed, will reduce the overall cost of new reactor designs. Layout considerations affect many areas which affect overall cost. These areas include operation, maintenance and licensing, as well as, capital cost. Layout can have a significant effect on how the plant satisfies regulatory issues such as separation, fire and flood control, access control and ALARA. Layout can determine the extent of modularization which can be realized and how it can be used to minimize construction time in the field. Modularization and parallel fabrication of items in the factory and in the field has proven to be a significant cost saver in a number of industries. It can also be a significant cost adder if implemented improperly. The objective of integrated plant layout and modularization should be to minimize plant lifetime costs and risks through effective minimization of capital and operating costs. Westinghouse has learned and acquired a significant number of “rules of thumb” and “lessons learned” from its experiences with development of the off shore power systems (barge mounted nuclear power plants) and its design and certification efforts of AP600. These insights could be of use to any reactor design if presented in a “best practices” format.

The objective of this task is to present our “best practices” in four documents, each of which can stand alone. The first is a presentation of layout standards. It would include what Westinghouse believes to be inviolate rules for layout of a nuclear plant. Each of the rules will have proven themselves to be cost effective. In addition to those which are obvious for reduction of capital and operating expense, the document will include those which reduce regulatory review time and expense. The second will be guidelines for layout with the objective of maximizing effective modularization. These will be developed from lessons learned in the modularization of AP600. Third, is a compilation of module design standards.

It presents rules which maximize the cost effective implementation of a modularization strategy. It will include standards for detail analysis, design and acceptance of modules (both structural and equipment).

The fourth is a set of guidelines for design details which provide for effective fabrication and assembly of modules. It is a set of lessons learned from detailed constructibility studies performed to enhance the cost effectiveness of AP600.

The basis for these documents were developed by Westinghouse to support the deployment of off shore power systems and AP600. Many of the concepts and precepts to be presented are incorporated into AP600, but they have not been assembled into single source documents and made generic. The information to be presented will allow significant cost savings in any reactor design, including STAR, if implemented early in the design cycle.
